

PART A: Short Answer – Write only the final answer in the space provided. [24 marks]

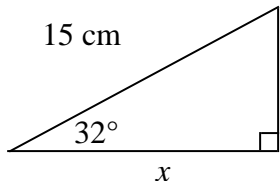
1. How many solutions are there to the following systems of linear equations?

(a) $y = \frac{2}{3}x + 4$ and $y = 3x - 7$ _____

(b) $y = \frac{1}{5}x + 2$ and $y = \frac{1}{5}x - 2$ _____
2. Factor completely:

 $m^3n^2 + m^2n^3$ _____
3. State the equation of a circle with centre (0, 0) and radius 5. _____
4. What is the slope of the line segment joining C(8, 17) and D(-1, 26)? _____
5. State the zeros of the equation $(2x + 6)(x - 4) = 0$ _____ & _____
6. Expand and simplify $2(x - 1)^2 + 3$ _____
7. Name the three transformations on $y = x^2$ that would give you the graph of $y = -2(x - 4)^2$. _____

8. Evaluate $\tan 56^\circ$ to 3 digits after the decimal. _____
9. True or false? If two triangles are similar then they are congruent. _____
10. Given $\sin \theta = 0.5$, find θ . _____
11. Calculate the length of the indicated side:

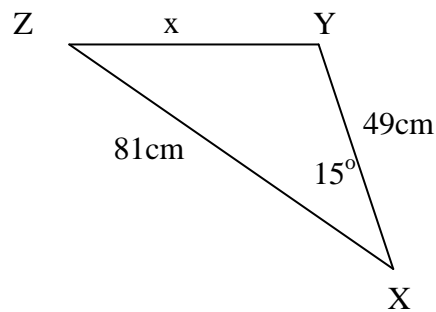


12. Name the intersection point of the three medians of a triangle _____
13. What is the first step needed to solve $x^2 - 4x = 60$? _____
14. For the parabola $y = -3(x - 2)^2 - 4$, state:

(a) the vertex _____

(b) the equation of the axis of symmetry: _____

15. If $y = 3x + 7$ represents the equation of a line AB, which of the following equations could represent the equation of a line perpendicular to AB?
 a) $y = -3x + 2$ b) $y = \frac{1}{3}x + 2$ c) $y = -\frac{1}{3}x + 2$ _____
16. In a triangle, the perpendicular distance from a vertex to the opposite side is called: _____
17. Is the point (3, 4) on the line defined by $2x + 4y = 22$?
 Yes or No? _____
18. What formula would you need to solve for x ? _____



19. For the following triangle:
-
- A right-angled triangle with vertices A, B, and C. Vertex C is at the top right and has a right-angle symbol. Vertex A is at the top left, and vertex B is at the bottom right. Side AC is horizontal and labeled ' $\sqrt{3}$ '. Side BC is vertical and labeled '1'. The hypotenuse AB is labeled '2'.
- (a) State $\sin B$ (*exact answer only*) _____
- (b) Find $\angle B$ _____

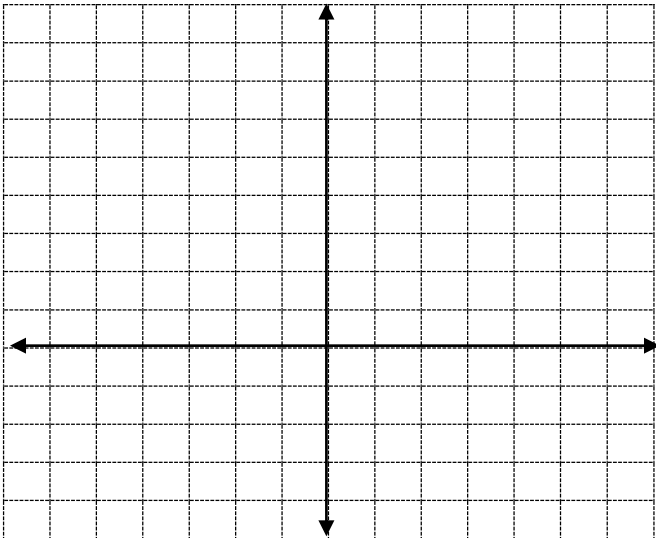
**Part B: Provide full solutions for all questions in the space provided.
 [64 marks]**

1. Solve the system of equations algebraically by the method of your choice.
- [5] $2x + y = 5$ $x - 2y = 10$

2. Graph and label the following functions on the grid provided.

[2] (a) $y = 2(x - 3)^2$

[2] (b) $y = -x^2 + 1$



3. Determine the distance between the points A(2, -4) and B(-3, -1).

[2]

4. Using finite differences, classify the following relation as linear, quadratic or neither.

[2]

x	y	First Differences	Second Differences
-2	-8		
-1	-1		
0	0		
1	1		
2	8		

The relation is _____.

5. Factor completely.

(a) $15ab + 20a - 6b - 8$

(b) $5a^2 - 11a + 2$

[2]

[3]

(c) $8x^2 - 50$

(d) $m^2 - 12mn + 36n^2$

[3]

[2]

6. Solve each of the following equations.

(a) $2x^2 - 3x + 1 = 0$

(b) $3.2x^2 + 28.9x - 8.4 = 0$

[4]

[4]

(c) $x^2 + 10 = 0$

[1]

7. Find in, $y = a(x - h)^2 + k$ form, the equation of the parabola with a vertex at (6, 2) which passes through (3, 20).

[3]

8. For the parabola defined by $y = -2x^2 - 12x - 14$, change the equation into vertex form $y = a(x - h)^2 + k$.

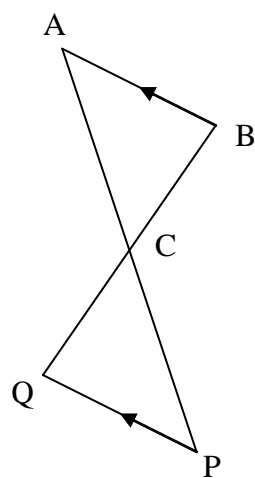
[4]

9. Find the equation of the right bisector of the line segment with endpoints A(4, -7) and B(-7, 4).

[5]

10. Prove that $\triangle ABC$ is similar to $\triangle PQC$.

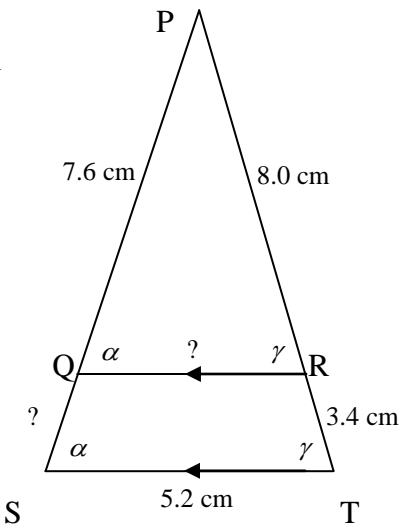
[3]



11. Given that $\triangle PQR$ is similar to $\triangle PST$.

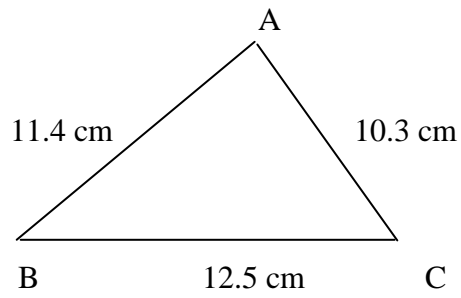
If $PR = 8.0$ cm, $PQ = 7.6$ cm, $ST = 5.2$ cm
and $RT = 3.4$ cm, find QR and QS .

[4]

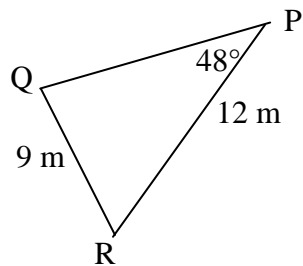


12. Solve for the indicated values.

[3] (a) Find angle B.



[4] (b) Find angles Q and R.



13. For the quadrilateral ABCD, where A(0, 0), B(3, 5), C(8,6), D(5,1):
(make sure you make a diagram to correctly place the coordinates)

[3] (a) prove that AB is parallel to CD.

[3] (b) prove that the diagonals of the quadrilateral bisect each other.

PART C: APPLICATION [23 marks]
For questions 2, 3, and 4: Remember to introduce variables to represent unknowns, draw a diagram if appropriate, set up the equations, solve for the unknowns, and conclude.

1. The following function gives the height, h metres, of a springboard diver above the surface of the water as a function of time, t seconds, since the diver leaves the diving board.

$$h = -4.9(t - 0.9)^2 + 6.95$$

a) What was the maximum height of the diver?

[1]

b) After how many seconds did the diver reach their maximum height?

[1]

c) What is the initial height of the diver?

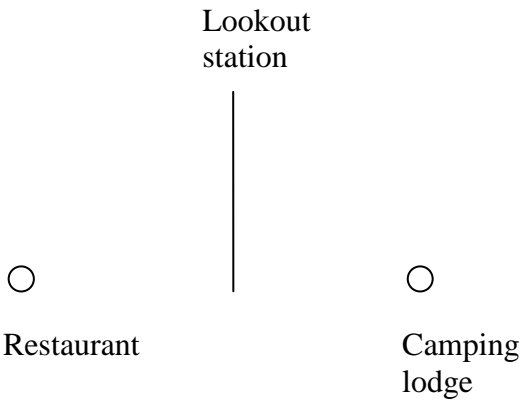
[2]

d) Find the height of the diver 0.5 seconds after the diver left the diving board.

[2]

2. From the top of a lookout station, the angle of depression to a camping lodge due east is 28° and the angle of depression to a restaurant due west of the station is 60° . If the tower is 35 m tall, how far apart are the camping lodge and the restaurant? (Complete the diagram by labeling the angles of depression).

[5]



3. The cost of getting internet service from Boyle's Better Buy is a flat monthly fee of \$10, plus \$0.75 per hour spent on-line. Robertson's Rip Off charges a flat monthly fee of \$5, plus \$1.00 per hour spent on-line.

- a) Using a system of linear equations, determine the number of hours spent online when the monthly costs are the same for these two companies.
- b) What is the monthly cost at this number of hours?

[5]

4. The size of a rectangular TV screen is defined by the length of its diagonal. A TV screen has a diagonal of 38 cm long. The width of the screen is 6 cm longer than its height. Determine the dimensions of the screen (width and height), to the nearest tenth of a centimeter.

[7]